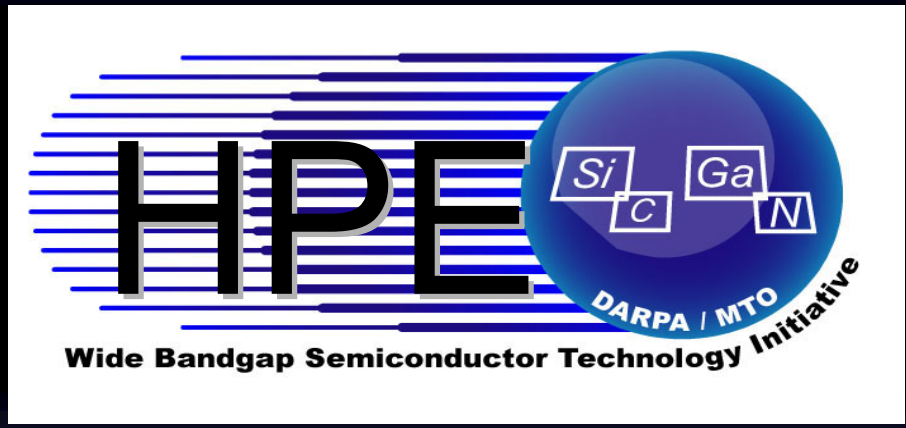
BAA 06-30 Proposer's Day Workshop Agenda

8:00-8:30	Registration and Continental Breakfast	
8:30-9:00	Welcome WBST-HPE Program Status / BAA Goals	Sharon Beermann-Curtin, DARPA
9:00-9:30	System Engineering / Integration	CAPT Michael Schwartz, Aircraft Carriers
9:30-9:45	Break, Submit Question Cards	
9:45-10:15	Device (PiN, MOSFET, IGBT) Status	Al Hefner, NIST
10:15-10:45	Independent SSPS Design Panel	John Amy, Syntek
10:45-11:00	Answer Submitted Questions	
11:00-11:30	Break, Poster Session, Submit Question Cards	
11:30-11:45	Answer Submitted Questions	
11:45-12:30	Poster Session (For Potential Proposer's to Discuss Teaming Opportunities)	
12:30	Adjourn	

Wide Bandgap Semiconductor Technology: High Power Electronics DARPA/PEO-Aircraft Carrier/ONR



BAA06-30 Proposer's Day

Sharon Beermann-Curtin
Microsystems Technology Office, DARPA
571/218-4935
16 May 2006

Proposer's Day Goals

Communication between Gov't and Proposers:

Technology status, Specific system issues, Desired outcomes, BAA specifics

Facilitated through: Presentations, Q&A sessions,

FAQ Website http://www.darpa.mil/mto/solicitations/

Communication between Industry:

Teaming opportunities

Facilitated through: Poster Session,

Teaming Website http://www.davincinetbook.com/teams/

Memorandum of Agreement

Director, DARPA / Chief of Naval Research / PEO-Aircraft Carrier

Approved by:

RADM Dennis M. Dwyer
Program Executive Officer, Aircraft Carriers

RADM Jay M. Cohen
Chief of Naval Research
U.S. Department of Navy

Dr. Anthony J. Tether
Director, Defense Advanced Research Projects Agency
U.S. Department of Defense

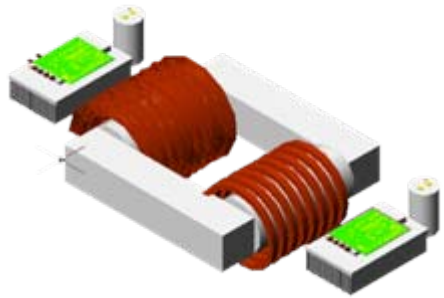
Program Technical Milestones

Task	Estimated Completion Date
Phase II **Develop 10-20kV switches (IGBT's, MOSFETS) and PiN diodes. Packaging.**	**3Q FY06**
Phase III **Integrate devices and 20kHz transformer into SSPS 2.7 MVA transformer prototype.**	**3Q FY08**
Phase IV **Demonstrate 2.7 MVA SSPS**	**1Q FY11**

Phase III Program Goal

Low Frequency Conventional Transformer (analog)

- 2.7MVA
- 13.8kV/450V (Δ/Y) 60Hz
- **6 tons/each**
- **10 m³/each**
- **fixed, single output**

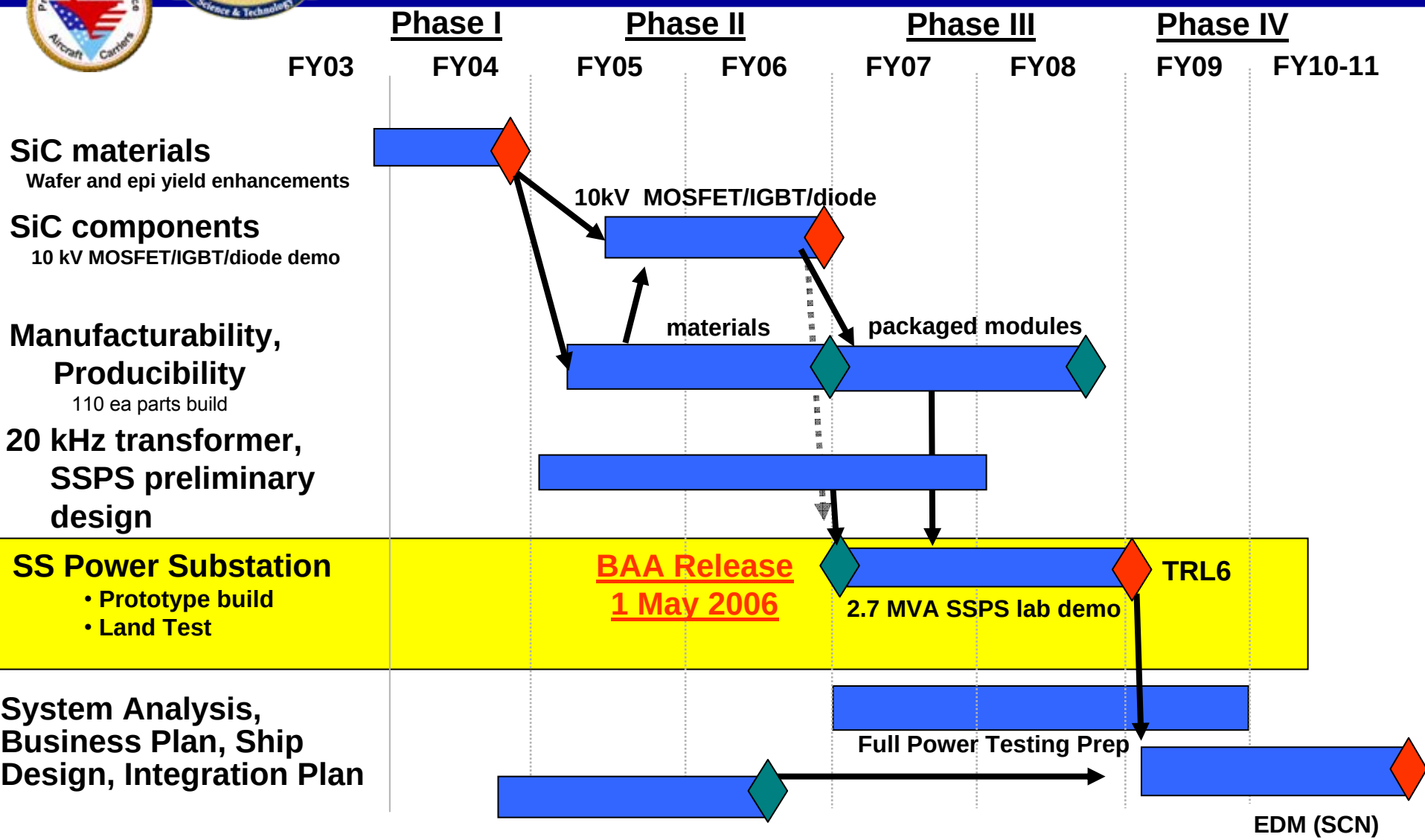


Estimated SiC-based Solid State Power Substation (digital)

- 2.7 MVA
- 13.8kV/465V (Δ/Y) 20 kHz
- **1.7 tons/each**
- **2.7 m³/each**
- **multiple taps/outputs**

Demonstrator Transformer:
13.8kV AC – 465V AC High Frequency Solid State Power Substation (SSPS)

Program Timeline



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BAA Timeline

BAA released
5/1/06

Abstracts due
5/30/06

Proposals Due
7/19/06

Industry Day
5/16/06

Response to Abstract Submissions on or about 6/14/06

Response to Proposal Submissions on or about 9/6/06

Program Demonstrators

- Base Technical Area: Single-Phase Demonstrator
  - 13.8/√3kV 60 Hz AC conversion to 700V DC
  - High Frequency 15-25kHz
  - Thermal Management (detailed approach)

- Optional Technical Area: Three-Phase Demonstrator
  - 2.7MVA, 13.8kV 60Hz AC conversion to 465V AC
  - High Frequency 15-25kHz
  - Integrated Thermal Management

Three Phase Demonstrator Must Deliver in Dec 09

Performance Criteria

Size
Weight
Efficiency
Thermal Mgmt
Continuous Operation (150hrs)
Robustness (graceful degradation)
Fault Tolerant
Modular
MIL-STD-1399 (NAVY) Conventional Txformer

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Program Challenges

- Parallel/Series SiC Devices
- Optimal Topology
- Thermal Management
- Packaging
- System Integration

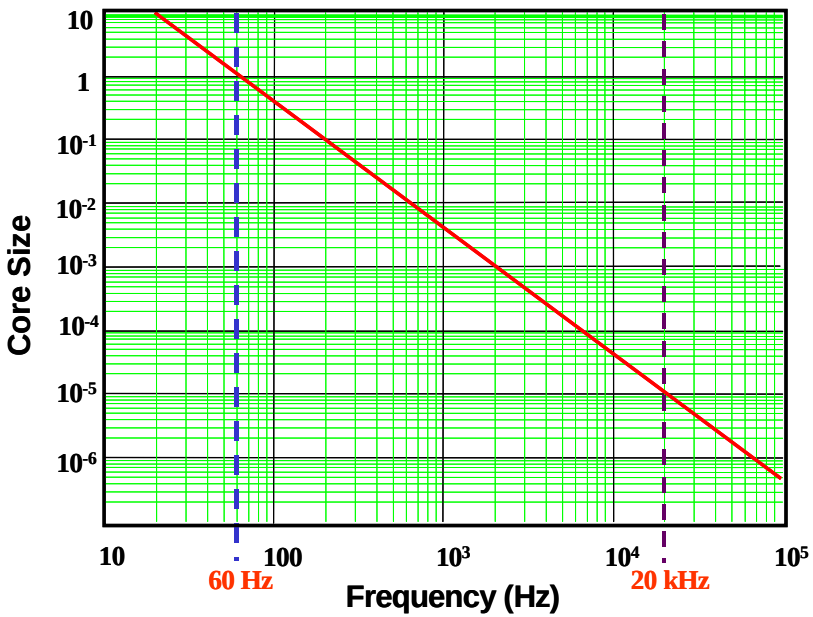
Evaluation Criteria

- Overall Scientific and Technical Merit
- Potential Contribution and Relevance to DARPA Mission
- Plans and Capability to Accomplish Technology Transition
- Offeror's Capabilities and Related Experience
- Cost Realism
- Schedule Realism

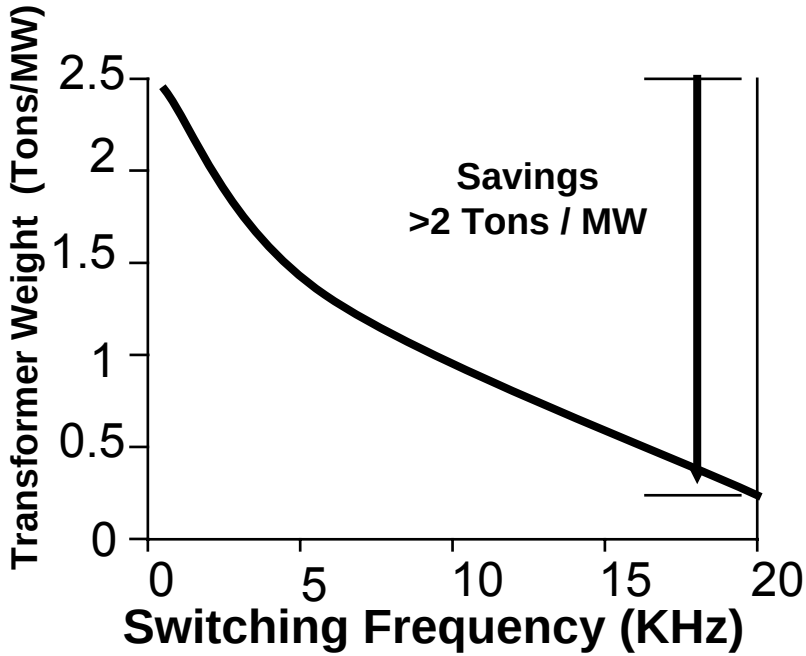
Higher Frequency Positive Ship Impact

BENEFITS:

- **Precise voltage regulation-Isolate voltage spikes, voltage dips regulated with capacitive energy storage in transformer**
- **Unity Power Factor (20% increase in power) better control, lower temperature rises**
- **Fast fault detection, protection, restoration**
- **DC Distribution**



$$CoreSize \sim \frac{1}{Frequency}$$



Silicon Carbide Reduces Transformer Weight by ~ 2 Tons per Megawatt of Power

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